SEQUENCE LISTING

```
<110> Yocum, Roger R.
      Patterson, Thomas A.
      Pero, Janice G.
      Hermann, Theron
<120> MICROORGANISMS AND PROCESSES FOR ENHANCED PRODUCTION OF
PANTOTHENATE
<130> BGI-154B
<150> 60/393826
<151> 2002-07-03
<160> 31
<170> PatentIn Ver. 2.0
<210> 1
<211> 194
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:promoter
      sequence
<220>
<221> -35 signal
<222> (136)..(141)
<220>
<221> -10_signal
\langle 222 \rangle (159)...(164)
<400> 1
gctattgacg acagetatgg ttcactgtcc accaaccaaa actgtgctca gtaccgccaa 60
tatttctccc ttgaggggta caaagaggtg tccctagaag agatccacgc tgtgtaaaaa 120
gcaaccccgc ctgt
                                                                    194
<210> 2
<211> 163
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:promoter
      sequence
<220>
<221> -35 signal
\langle 222 \rangle (11\overline{3})...(118)
<220>
<221> -10_signal
\langle 222 \rangle (13\overline{6})...(141)
```

```
<400> 2
gcctacctag cttccaagaa agatatccta acagcacaag agcggaaaga tgttttgttc 60
tacatccaga acaacctctg ctaaaattcc tgaaaaattt tgcaaaaagt tgttgacttt 120
atctacaagg tgtggtataa taatcttaac aacagcagga cgc
                                                                    163
<210> 3
<211> 127
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:promoter
      sequence
<220>
<221> -35 signal
<222> (34)..(39)
<220>
<221> -10 signal
<222> (58)..(63)
<220>
<221> -35_signal
<222> (75)..(80)
<220>
<221> -10 signal
<222> (98)..(103)
gaggaatcat agaattttgt caaaataatt ttattgacaa cgtcttatta acgttgatat 60
aatttaaatt ttatttgaca aaaatgggct cgtgttgtac aataaatgta gtgaggtgga 120
tgcaatg
                                                                    127
<210> 4
<211> 24
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:ribosome
      binding site
<400> 4
taaacatgag gaggagaaaa catg
                                                                    24
<210> 5
<211> 28
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: ribosome
      binding site
```

```
<400> 5
                                                                       28
attcgagaaa tggagagaat ataatatg
<210> 6
<211> 13
<212> DNA
<213> Artificial Sequence
<223> Description of Artificial Sequence:ribosome
      binding site
<400> 6
agaaaggagg tga
                                                                       13
<210> 7
<211> 23
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: ribosome
      binding site
<220>
<221> misc_feature
<222> 17, 18, 19, 20
\langle 223 \rangle n = a, t, c, or g
<400> 7
ttaagaaagg aggtgannnn atg
                                                                       23
<210> 8
<211> 23
<212> DNA
<213> Artificial Sequence
<223> Description of Artificial Sequence:ribosome
      binding site
<220>
<221> misc_feature
<222> 16, 17, 18, 19, 20
\langle 223 \rangle n = a, c, t, or g
<400> 8
                                                                      23
ttagaaagga ggtgannnnn atg
<210> 9
<211> 23
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:ribosome
      binding site
<220>
<221> misc_feature
```

```
<222> 14, 15, 16, 17, 18, 19, 20
\langle 223 \rangle n = a, c, t, or g
<400> 9
                                                                       23
agaaaggagg tgannnnnnn atg
<210> 10
<211> 22
<212> DNA
<213> Artificial Sequence
<223> Description of Artificial Sequence:ribosome
      binding site
<220>
<221> misc feature
<222> 14, 15, 16, 17, 18, 19
\langle 223 \rangle n = a, c, t, or g
<400> 10
                                                                       22
agaaaggagg tgannnnna tg
<210> 11
<211> 25
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:ribosome
      binding site
<400> 11
                                                                      25
ccctctagaa ggaggagaaa acatg
<210> 12
<211> 24
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:ribosome
      binding site
<400> 12
                                                                      24
ccctctagag gaggagaaaa catg
<210> 13
<211> 23
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: ribosome
      binding site
<400> 13
ttagaaagga ggatttaaat atg
                                                                      23
<210> 14
```

<211> <212> <213>			
<220> <223>	Description of Artificial binding site	Sequence:ribosome	
<400> ttagaa	14 aagga ggtttaatta atg		23
<210> <211> <212> <213>	23		
<220> <223>	Description of Artificial binding site	Sequence: ribosome	
<400> ttagaa	15 aagga ggtgatttaa atg		23
<210> <211> <212> <213>	23		
<220> <223>	Description of Artificial binding site	Sequence: ribosome	
<400> ttagaa	16 aagga ggtgtttaaa atg		23
<210> <211> <212> <213>	28		
<220> <223>	Description of Artificial binding site	Sequence: ribosome	
<400> attcga	17 agaaa ggaggtgaat ataatatg		28
<210><211><211><212><213>	27		
<220> <223>	Description of Artificial binding site	Sequence:ribosome	
<400> attcga	18 agaaa ggaggtgaat aataatg		27
<210>	19		

```
<211> 28
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: ribosome
      binding site
<400> 19
                                                                    28
attcgtagaa aggaggtgaa ttaatatg
<210> 20
<211> 51
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:5' PCR primer
<223> for serA gene
<400> 20
ccctctagag gaggagaaaa catgtttcga gtattggtct cagacaaaat g
                                                                    51
<210> 21
<211> 43
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: 3' PCR primer
<223> for serA gene
<400> 21
cccggatcca attatggcag atcaatgagc ttcacagaca caa
                                                                    43
<210> 22
<211> 48
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:5' PCR primer
<223> for glyA gene
<400> 22
ggatctagag gaggtgtaaa catgaaacat ttacctgcgc aagacgaa
                                                                    48
<210> 23
<211> 43
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:3' PCR primer
<223> for glyA gene
cggggatccc ccatcaacaa ttacacactt ctattgattc tac
                                                                    43
<210> 24
```

```
<211> 7926
<212> DNA
<213> Artificial Sequence
<223> Description of Artificial Sequence:serA overexpression
<223> plasmid
<400> 24
gaattttgcg qccqcttcga aagctgtaat ataaaaacct tcttcaacta acgqqgcagg 60
ttagtgacat tagaaaaccg actgtaaaaa gtacagtcgg cattatctca tattataaaa 120
gccagtcatt aggcctatct gacaattcct gaatagagtt cataaacaat cctgcatgat 180
aaccatcaca aacagaatga tgtacctgta aagatagcgg taaatatatt gaattacctt 240
tattaatgaa ttttcctgct gtaataatgg gtagaaggta attactatta ttattgatat 300
ttaagttaaa cccagtaaat gaagtccatg gaataataga aagagaaaaa gcattttcag 360
gtataggtgt tttgggaaac aatttccccg aaccattata tttctctaca tcagaaaggt 420
ataaatcata aaactctttg aagtcattct ttacaggagt ccaaatacca gagaatgttt 480
tagatacacc atcaaaaatt gtataaagtg gctctaactt atcccaataa cctaactctc 540
cqtcqctatt qtaaccaqtt ctaaaaqctq tatttqaqtt tatcaccctt qtcactaaqa 600
aaataaatgc agggtaaaat ttatatcctt cttgttttat gtttcggtat aaaacactaa 660
tatcaatttc tgtggttata ctaaaagtcg tttgttggtt caaataatga ttaaatatct 720
cttttctctt ccaattgtct aaatcaattt tattaaagtt catttgatat gcctcctaaa 780
tttttatcta aagtgaattt aggaggetta ettgtetget ttetteatta gaatcaatce 840
ttttttaaaa gtcaatatta ctgtaacata aatatatatt ttaaaaaatat cccactttat 900
ccaattttcg tttqttgaac taatgggtgc tttagttgaa gaataaagac cacattaaaa 960
aatgtggtct tttgtgtttt tttaaaggat ttgagcgtag cgaaaaatcc ttttctttct 1020
tatcttgata ataaqqqtaa ctattqaatt cqqtaccaaq aqtttqtaqa aacqcaaaaa 1080
ggccatccqt caggatggcc ttctqcttaa tttqatqcct ggcagtttat ggcgggcgtc 1140
ctgcccgcca cctccgggc cqttgcttcg caacqttcaa atccqctccc gqcgqatttq 1200
tcctactcag gagagegttc accgacaaac aacagataaa acgaaaggcc cagtctttcg 1260
actgageett tegttttatt tgatgeetgg cagtteecta etetegeatg gggagaeeee 1320
acactaccat cggcgctacg gcgtttcact tctgagttcg gcatggggtc aggtgggacc 1380
accgcgctac tgccgccagg caaattctgt tttatcagac cgcttctgcg ttctgattta 1440
atctgtatca ggctgaaaat cttctctcat ccgccaaaac aggatccaat tatggcagat 1500
caatgagett cacagacaca atatcaggga catttgttag ttetttcaca attttatett 1560
ccagatgtct gtcaaaggaa agcatcatga tggcttctcc gcctttttcc ttacggccaa 1620
cctgcatagt tgcaatgtta atatcattat ctccqaqaat acqtcctact cqqccqatqa 1680
cacctqttqt atcttqatqc tqqatataca ccaaqtqacc aqtcqqataa aaatcaatat 1740
taaatccatt gatctcgaca attcgttctc cgaaatgagg aatatacgta gccgttacag 1800
taaaggtgct gcggtctcct gtcactttta cgctgatgca gttatcgtat ccagattcag 1860
aagaggaaat tttttcactg aagctaatgc cgcgttcttt tgcgacaccc ccggcattga 1920
cctcattaac agtagagtct acgcgcggtt ttaaaaaagcc tgacagaagg gcttttgtaa 1980
tgaacgatgt ttcaagttta gcaattgtgc cttcatattg aatggcaaca tcctgtactg 2040
gttctttcat gcactgtgat acaaggctgc caatttttcc tgcaatttga tggtaaggct 2100
taattttagc aaattcatct tttgtcatgg caggcaggtt gatagctgac atgacaggca 2160
ggccttttgc gaactgcaga acttcttctg acacttgggc ggcgacattg agctgtgctt 2220
ctttcgttga tgctcccaag tgaggagtgg caatgactaa tggatgatca acaagtttgt 2280
tgtcaactgg cggttcgact tcgaaaacgt caagcgctgc tcccgcaaca tgcccgtttt 2340
ccaaagcttc gagaagtgct gcttcatcga taattccgcc tcgcgcacag ttaattaagc 2400
gaacgccttt tttcgttttt gcaatcgttt ctttattcaa taagcctttt gtttcttttg 2460
ttaaaggcgt gtgaacggta atgatatccg cactttcaag cacttcttca aatgtacggc 2520
tgtttacgcc gatttttttc gctctttctt ccgttaagaa aggatcaaaa acqtqcacaq 2580
tcataccgaa cgctcctcga cgctgtgcaa tttcacttcc gattcggcct aatcctacaa 2640
taccaagcgt ttttccataa agctctgaac cgacataagc tgtgcggttc cactctctgg 2700
atttcactga gatattagcc tqcggaatgt gtctcattaa agaaqagatc attqcaaatg 2760
tatgctcagc tgtcgaaatg gtgttgccgt tcggagcatt gatcacgatt accccgtgtt 2820
tcgtagcctc atcaatatcg atattatcga caccgacacc ggctcttccg acaattttta 2880
aagaagtcat tttgttgaaa aggtcttctg ttacttttgt cgcgcttcgc accaaaagag 2940
catcaaaagt atgtaattca tcttctgcat ctgctacgtt tttttgaacg atttcaataa 3000
agtotgatto aataagtggo tgtaaacogt cgttgctcat tttgtctgag accaatacto 3060
```

```
qaaacatgtt ttctcctcct ctaqaqcqtc ctqctqttgt taagattatt ataccacacc 3120
ttqtaqataa agtcaacaac tttttqcaaa atttttcagg aattttagca gaggttgttc 3180
tggatgtaga acaaaacatc tttccgctct tgtgctgtta ggatatcttt cttggaagct 3240
aggtaggcct cgagttatgg cagttggtta aaaggaaaca aaaagaccgt tttcacacaa 3300
aacggtcttt ttcgatttct ttttacagtc acagccactt ttgcaaaaac cggacagctt 3360
catgccttat aactgctgtt tcggtcgaca agcttcgcga agcggccgca aaattcactg 3420
gccgtcgttt tacaacgtcg tgactgggaa aaccctggcg ttacccaact taatcgcctt 3480
geageacate eccetttege eagetggegt aatagegaag aggeeegeac egategeeet 3540
teceaacagt tgegeageet gaatggegaa tggegeetga tgeggtattt teteettaeg 3600
catctgtgcg gtatttcaca ccgcatatgg tgcactctca gtacaatctg ctctgatgcc 3660
gcatagttaa gccagcccg acacccgcca acacccgctg actatgcttg taaaccgttt 3720
tgtgaaaaaa tttttaaaat aaaaaagggg acctctaggg tccccaatta attagtaata 3780
taatctatta aaggtcattc aaaaggtcat ccaccggatc agcttagtaa agccctcgct 3840
agattttaat gcggatgttg cgattacttc gccaactatt gcgataacaa gaaaaagcca 3900
gcctttcatg atatatctcc caatttgtgt agggcttatt atgcacgctt aaaaataata 3960
aaagcagact tgacctgata gtttggctgt gagcaattat gtgcttagtg catctaacgc 4020
ttgagttaag ccgcgccgcg aagcggcgtc ggcttgaacg aattgttaga cattatttgc 4080
cgactacctt ggtgatctcg cctttcacgt agtggacaaa ttcttccaac tgatctgcgc 4140
qcqaqqccaa qcqatcttct tcttqtccaa qataaqcctq tctaqcttca aqtatqacqq 4200
gctgatactg ggccggcagg cgctccattg cccagtcggc agcgacatcc ttcggcgcga 4260
ttttgccggt tactgcgctg taccaaatgc gggacaacgt aagcactaca tttcgctcat 4320
cgccagccca gtcgggcggc gagttccata gcgttaaggt ttcatttagc gcctcaaata 4380
gatectgtte aggaacegga teaaagagtt eeteegeege tggaeetace aaggeaacge 4440
tatgttctct tgcttttgtc agcaagatag ccagatcaat gtcgatcgtg qctggctcga 4500
agatacctgc aagaatgtca ttgcgctgcc attctccaaa ttgcagttcg cgcttagctg 4560
gataacgcca cggaatgatg tcgtcgtgca caacaatggt gacttctaca gcgcggagaa 4620
tctcgctctc tccaggggaa gccgaagttt ccaaaaggtc gttgatcaaa gctcgccgcg 4680
ttgtttcatc aagccttacg gtcaccgtaa ccaqcaaatc aatatcactg tgtggcttca 4740
ggccgccatc cactgcggag ccgtacaaat gtacggccag caacgtcggt tcgagatggc 4800
gctcqatqac gccaactacc tctqataqtt qaqtcqatac ttcqqcqatc accqcttccc 4860
tcatgatgtt taactttqtt ttagggcgac tgccctgctg cgtaacatcg ttgctqctcc 4920
ataacatcaa acatcgaccc acggcgtaac gcgcttgctg cttggatgcc cgaggcatag 4980
actgtacccc aaaaaaacag tcataacaag ccatgaaaac cgccactgcg ccgttaccac 5040
cgctgcgttc ggtcaaggtt ctggaccagt tgcgtgagcg catacgctac ttgcattaca 5100
gettacgaac cgaacagget tatgtccact gggttcgtge cttcatccgt ttccacggtg 5160
tgcgtcaccc ggcaaccttg ggcagcagcg aagtcgaggc atttctgtcc tggctggcga 5220
acgagegeaa ggttteggte tecaegeate gteaggeatt ggeggeettg etgttettet 5280
acggcaaggt gctgtgcacg gatctgccct ggcttcagga gatcggaaga cctcggccgt 5340
cgcggcgctt gccggtggtg ctgacccgg atgaagtggt tcgcatcctc ggttttctgg 5400
aaggcgagca tcgtttgttc gcccagcttc tgtatggaac gggcatgcgg atcagtgagg 5460
gtttgcaact gcgggtcaag gatctggatt tcgatcacgg cacgatcatc gtgcgggagg 5520
gcaagggctc caaggatcgg gccttgatgt tacccgagag cttggcaccc agcctgcgcg 5580
agcaggggaa ttgatccggt ggatgacctt ttgaatgacc tttaatagat tatattacta 5640
attaattggg gaccctagag gtcccctttt ttattttaaa aatttttca caaaacggtt 5700
tacaagcata acgggttttg ctgcccgcaa acgggctgtt ctggtgttgc tagtttgtta 5760
tcagaatcgc agatccggct tcaggtttgc cggctgaaag cgctatttct tccagaattg 5820
ccatgatttt ttccccacgg gaggcgtcac tggctcccgt gttgtcggca gctttgattc 5880
qataaqcaqc atcgcctqtt tcaqqctqtc tatqtqtqac tqttqaqctq taacaaqttq 5940
tctcaggtgt tcaatttcat gttctagttg ctttgtttta ctggtttcac ctgttctatt 6000
aggtgttaca tgctgttcat ctgttacatt gtcgatctgt tcatggtgaa cagctttaaa 6060
tgcaccaaaa actcgtaaaa gctctgatgt atctatcttt tttacaccgt tttcatctgt 6120
gcatatggac agttttccct ttgatatcta acggtgaaca gttgttctac ttttgtttgt 6180
tagtettgat getteactga tagatacaag agecataaga aceteagate etteegtatt 6240
tagccagtat gttctctagt gtggttcgtt gtttttgcgt gagccatgag aacgaaccat 6300
tgagatcatg cttactttgc atgtcactca aaaattttgc ctcaaaactg gtgagctgaa 6360
tttttqcaqt taaaqcatcq tqtaqtqttt ttcttaqtcc qttacqtaqq taqqaatctq 6420
atgtaatggt tgttggtatt ttgtcaccat tcatttttat ctggttgttc tcaagttcgg 6480
ttacqaqatc catttqtcta tctaqttcaa cttqqaaaat caacqtatca qtcqqqcqqc 6540
ctcgcttatc aaccaccaat ttcatattgc tgtaagtgtt taaatcttta cttattggtt 6600
tcaaaaccca ttggttaagc cttttaaact catggtagtt attttcaagc attaacatga 6660
```

```
cttttaataa ccactcataa atcctcatag agtatttgtt ttcaaaaagac ttaacatgtt 6780
ccagattata ttttatgaat ttttttaact ggaaaagata aggcaatatc tcttcactaa 6840
aaactaattc taatttttcg cttgagaact tggcatagtt tgtccactgg aaaatctcaa 6900
agcctttaac caaaggattc ctgatttcca cagttctcgt catcagctct ctggttgctt 6960
tagctaatac accataagca ttttccctac tgatgttcat catctgagcg tattggttat 7020
aagtgaacga taccgtccgt tctttccttg tagggttttc aatcgtgggg ttgagtagtg 7080
ccacacagca taaaattagc ttggtttcat gctccgttaa gtcatagcga ctaatcgcta 7140
gttcatttgc tttgaaaaca actaattcag acatacatct caattggtct aggtgatttt 7200
aatcactata ccaattgaga tgggctagtc aatgataatt actagtcctt ttcctttgag 7260
ttqtqqqtat ctqtaaattc tqctaqacct ttqctqqaaa acttqtaaat tctqctaqac 7320
cctctgtaaa ttccgctaga cctttgtgtg ttttttttgt ttatattcaa gtggttataa 7380
tttatagaat aaagaaagaa taaaaaaga taaaaagaat agatcccagc cctgtgtata 7440
acteactact ttagtcagtt cegcagtatt acaaaaggat gtegcaaacg ctgtttgctc 7500
ctctacaaaa cagaccttaa aaccctaaag gcttaagtag caccctcgca agctcgggca 7560
aategetgaa tatteetttt gteteegace ateaggeace tgagtegetg tettttegt 7620
gacattcagt tegetgeget caeggetetg geagtgaatg ggggtaaatg geactacagg 7680
cgccttttat ggattcatgc aaggaaacta cccataatac aagaaaagcc cgtcacgggc 7740
ttctcagggc gttttatggc gggtctgcta tgtggtgcta tctgactttt tgctgttcag 7800
cagttcctgc cctctgattt tccagtctga ccacttcgga ttatcccgtg acaggtcatt 7860
cagactggct aatgcaccca gtaaggcagc ggtatcatca acaggcttac ccgtcttact 7920
qtcaac
<210> 25
<211> 7701
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: glyA overexpression
<223> plasmid
<400> 25
gaattttgcg gccgcttcga aagctgtaat ataaaaacct tcttcaacta acggggcagg 60
ttagtgacat tagaaaaccg actgtaaaaa gtacagtcgg cattatctca tattataaaa 120
qccaqtcatt aggcctatct gacaattcct gaatagagtt cataaacaat cctgcatgat 180
aaccatcaca aacagaatga tgtacctgta aagatagcgg taaatatatt gaattacctt 240
tattaatgaa ttttcctgct gtaataatgg gtagaaggta attactatta ttattgatat 300
ttaagttaaa cccagtaaat gaagtccatg gaataataga aagagaaaaa gcattttcag 360
gtataggtgt tttgggaaac aatttccccg aaccattata tttctctaca tcagaaaggt 420
ataaatcata aaactetttg aagteattet ttacaggagt ccaaatacca gagaatgttt 480
tagatacacc atcaaaaatt gtataaagtg gctctaactt atcccaataa cctaactctc 540
cqtcqctatt qtaaccaqtt ctaaaaqctq tatttqaqtt tatcaccctt qtcactaaqa 600
aaataaatgc agggtaaaat ttatatcctt cttgttttat gtttcggtat aaaacactaa 660
tatcaatttc tgtggttata ctaaaagtcg tttgttggtt caaataatga ttaaatatct 720
cttttctctt ccaattgtct aaatcaattt tattaaagtt catttgatat gcctcctaaa 780
tttttatcta aagtgaattt aggaggctta cttgtctgct ttcttcatta gaatcaatcc 840
ttttttaaaa gtcaatatta ctgtaacata aatatatatt ttaaaaatat cccactttat 900
ccaattttcg tttgttgaac taatgggtgc tttagttgaa gaataaagac cacattaaaa 960
aatgtggtct tttgtgtttt tttaaaggat ttgagcgtag cgaaaaatcc ttttctttct 1020
tatcttqata ataaggqtaa ctattqaatt cggtaccaag agtttqtaga aacgcaaaaa 1080
ggccatccgt caggatqqcc ttctqcttaa tttgatqcct ggcaqtttat qqcqqqcqtc 1140
ctgcccgcca ccctccqqqc cgttqcttcq caacgttcaa atccqctccc qqcggatttq 1200
tectacteag gagagegtte accgacaaac aacagataaa acgaaaggee cagtettteg 1260
actgageett tegttttatt tgatgeetgg eagtteeta etetegeatg gggagaeece 1320
acactaccat cggcgctacg gcgtttcact tctqagttcg gcatggggtc aggtgggacc 1380
accgcgctac tgccgccagg caaattctgt tttatcagac cgcttctgcg ttctgattta 1440
atctgtatca ggctgaaaat cttctctcat ccgccaaaac aggatccccc atcaacaatt 1500
```

acttaaattc atcaaggcta atctctatat ttgccttgtg agttttcttt tgtgttagtt 6720

```
acacacttct attgattcta caaaaaaaga cattgagttt caagaacatc gtcaaaaaac 1560
ccgccgggca taagcccaag cgggttttag gatcttaata atctaattct ttatataaag 1620
quaatttate agteagagea getacaeget gtettgette tteaagtttt cetteatett 1680
cgtqgttttt caatgcaagc gcaatgatag caccgacttc ttctaatgcg tctccgtcaa 1740
aaccgcgct ggttacagca gctgtaccaa gacggatgcc gcttgttacg aaaggttttt 1800
caggatcata tggaatcgcg tttttgttag acgtaatacc aatttcatca agtacatgct 1860
ccgcaacctt accagtcagt ccgagcgaac gaaggtcaac aaggataagg tggttgtctg 1920
ttccgcctga aacgagctgg atgccctctt tcgttaaggc ttcagccaga cgtttcgcgt 1980
ttgaaatgac gttttgtgca tatgttttga aatcgtcctg caatacttca ccgaatgaaa 2040
cagcttttqc qqcaataacq tqcatcaqaq qqccqccttq aattccaqqq aaqatcqatt 2100
tatcaatttt cttqccaaac tcttcacqqc aaaqqatcat accqccqcqa qqaccqcqaa 2160
qtgttttatg tgttgttgtt gtaacgaaat cagcgtaagg aaccgggttt ggatgaaggc 2220
ctgccgcaac aagtcctgcg atatgtgcca tatccaccat gaagtaagcg ccgacttcat 2280
cagcaatttc acggaatttc ttaaagtcga ttgtacgagg atacgcactt gctcctgcta 2340
cgataagctt cggtttatga gcgagggctt tttcacgcac gtcatcgtaa tcaatatatt 2400
gagtttettt atetaegeeg taeteaacaa agttatattg aacaeegetg aagttgaetg 2460
ggcttccgtg tgttaaatgg ccgccgtggg agaggttcat cccaagtaca gtatcgcctt 2520
gctccaaaat cgtgaagtac actgccatgt ttgcttgtgc gcctgaatga ggctgaacgt 2580
ttacatgctc cgctccaaag atttccttcg cgcggtcacg ggcgatatct tcaacgacat 2640
cgacgtgctc gcatccgccg tagtagcgtt tgcccggata tccttctgcg tacttatttg 2700
tcaaaacaga teettgtget teeataaeeg etteaettae aaagttetea gaageaatea 2760
attcqatctt agtctqttqq cqttcacqct catttttaat qqcqttaaac acttqttcqt 2820
cttgcgcagg taaatgtttc atgtttacac ctcctctaga gcgtcctgct gttgttaaga 2880
ttattatacc acaccttqta qataaaqtca acaacttttt qcaaaatttt tcaqqaattt 2940
tagcagaggt tgttctggat gtagaacaaa acatctttcc gctcttgtgc tgttaggata 3000
tctttcttgg aagctaggta ggcctcgagt tatggcagtt ggttaaaagg aaacaaaaag 3060
acceptttca cacaaaacgg tettttcga tttetttta cagteacage cacttttgca 3120
aaaaccggac agcttcatgc cttataactg ctgtttcggt cgacaagctt cgcgaagcgg 3180
ccgcaaaatt cactggccgt cgttttacaa cgtcgtgact gggaaaaccc tggcgttacc 3240
caacttaatc geettgeage acateceeet ttegeeaget ggegtaatag egaagaggee 3300
cgcaccgatc gcccttccca acagttgcgc agcctgaatg gcgaatggcg cctgatgcgg 3360
tattttctcc ttacgcatct gtgcggtatt tcacaccgca tatggtgcac tctcagtaca 3420
atctgctctg atgccgcata gttaagccag ccccgacacc cgccaacacc cgctgactat 3480
gcttgtaaac cqttttgtga aaaaattttt aaaataaaaa aggggacctc tagggtcccc 3540
aattaattag taatataatc tattaaaggt cattcaaaag gtcatccacc ggatcagctt 3600
aqtaaaqccc tcqctagatt ttaatqcqqa tqttqcqatt acttcqccaa ctattqcqat 3660
aacaagaaaa agccagcctt tcatgatata tctcccaatt tgtgtagggc ttattatgca 3720
cgcttaaaaa taataaaagc agacttgacc tgatagtttg gctgtgagca attatgtgct 3780
tagtgcatct aacgettgag ttaagcegeg cegegaageg gegteggett gaacgaattg 3840
ttagacatta tttgccgact accttggtga tctcgccttt cacgtagtgg acaaattctt 3900
ccaactgate tgcgcgcgag gccaagcgat cttcttcttg tccaagataa gcctgtctag 3960
cttcaaqtat qacqqqctqa tactqqqccq qcaqqcqctc cattqcccaq tcqqcaqcqa 4020
catcettegg egegattttg ceggttactg egetgtacca aatgegggac aacgtaagca 4080
ctacatttcg ctcatcgcca gcccagtcgg gcggcgagtt ccatagcgtt aaggtttcat 4140
ttagcgcctc aaatagatcc tgttcaggaa ccggatcaaa gagttcctcc gccgctggac 4200
ctaccaaggc aacgctatgt tctcttgctt ttgtcagcaa gatagccaga tcaatgtcga 4260
tcgtggctgg ctcgaagata cctgcaagaa tgtcattgcg ctgccattct ccaaattgca 4320
gttcgcgctt agctggataa cgccacggaa tgatgtcgtc gtgcacaaca atggtgactt 4380
ctacagegeg gagaateteg eteteteeag gggaageega agttteeaaa aggtegttga 4440
tcaaagctcg ccgcgttgtt tcatcaagcc ttacggtcac cgtaaccagc aaatcaatat 4500
cactgtgtgg cttcaggccg ccatccactg cggagccgta caaatgtacg gccagcaacg 4560
teggttegag atggegeteg atgaegeeaa etaeetetga tagttgagte gataettegg 4620
cqatcaccgc ttccctcatq atgtttaact ttgttttagg gcgactgccc tgctgcgtaa 4680
categttqct getecataac atcaaacate gacceaegge gtaaegeget tgetgettgg 4740
atgcccqaqq cataqactqt accccaaaaa aacaqtcata acaaqccatq aaaaccqcca 4800
ctgcgccgtt accaccgctg cgttcggtca aggttctgga ccagttgcgt gagcgcatac 4860
gctacttgca ttacagctta cgaaccgaac aggcttatgt ccactgggtt cgtgccttca 4920
tccqtttcca cqqtqtqcqt cacccqqcaa ccttqqqcaq caqcqaaqtc qaqqcatttc 4980
tgtcctqqct gqcqaacqaq cqcaaqqttt cqqtctccac qcatcqtcaq qcattqqcqq 5040
ccttgctgtt cttctacggc aaggtgctgt gcacggatct gccctggctt caggagatcg 5100
```

```
gaagaceteg geegtegegg egettgeegg tggtgetgae eeeggatgaa gtggttegea 5160
teeteggttt tetggaagge gageategtt tgttegeeca gettetgtat ggaaegggea 5220
tgcggatcag tgagggtttg caactgcggg tcaaggatct ggatttcgat cacggcacga 5280
tcatcqtqcq qqaqqqcaaq qqctccaaqq atcqqqcctt gatqttaccc qaqaqcttqq 5340
cacccagcct gcgcgagcag gggaattgat ccggtggatg accttttgaa tgacctttaa 5400
tagattatat tactaattaa ttggggaccc tagaggtccc cttttttatt ttaaaaaattt 5460
tttcacaaaa cggtttacaa gcataacggg ttttgctgcc cgcaaacggg ctgttctggt 5520
gttgctagtt tgttatcaga atcgcagatc cggcttcagg tttgccggct gaaagcgcta 5580
tttcttccag aattgccatg attttttccc cacgggaggc gtcactggct cccgtgttgt 5640
eggeagettt gattegataa geageatege etgttteagg etgtetatgt gtgaetgttg 5700
agctqtaaca agttqtctca gqtqttcaat ttcatqttct agttqctttg ttttactggt 5760
ttcacctqtt ctattagqtq ttacatqctq ttcatctqtt acattqtcqa tctqttcatq 5820
gtgaacagct ttaaatgcac caaaaactcg taaaagctct gatgtatcta tcttttttac 5880
acceptttca totateata tagacaettt tocotttaat atotaaceet gaacaettat 5940
tctacttttg tttgttagtc ttgatgcttc actgatagat acaagagcca taagaacctc 6000
agateettee gtatttagee agtatgttet etagtgtggt tegttgtttt tgegtgagee 6060
atgagaacga accattgaga tcatgcttac tttgcatgtc actcaaaaat tttgcctcaa 6120
aactggtgag ctgaattttt gcagttaaag catcgtgtag tgtttttctt agtccgttac 6180
qtaqqtaqqa atctqatqta atqqttqttq qtattttqtc accattcatt tttatctqqt 6240
tgttctcaag ttcggttacg agatccattt gtctatctag ttcaacttgg aaaatcaacg 6300
tatcaqtcqq qcqqcctcqc ttatcaacca ccaatttcat attqctqtaa qtqtttaaat 6360
ctttacttat tggtttcaaa acccattggt taagcctttt aaactcatgg tagttatttt 6420
caaqcattaa catqaactta aattcatcaa qqctaatctc tatatttqcc ttqtqaqttt 6480
tcttttqtqt taqttctttt aataaccact cataaatcct catagagtat ttgttttcaa 6540
aagacttaac atgttccaga ttatatttta tgaatttttt taactggaaa agataaggca 6600
atatetette actaaaaact aattetaatt tttegettga gaacttggca tagtttgtee 6660
actggaaaat ctcaaagcct ttaaccaaag gattcctgat ttccacagtt ctcgtcatca 6720
gctctctggt tgctttagct aatacaccat aagcattttc cctactgatg ttcatcatct 6780
gagcqtattq qttataaqtq aacqataccq tccqttcttt ccttqtaqqq ttttcaatcq 6840
tqqqqttqaq taqtqccaca caqcataaaa ttaqcttqqt ttcatqctcc qttaaqtcat 6900
agggactaat cgctagttca tttgctttga aaacaactaa ttcagacata catctcaatt 6960
ggtctaggtg attttaatca ctataccaat tgagatgggc tagtcaatga taattactag 7020
tccttttcct ttgagttgtg ggtatctgta aattctgcta qacctttqct qqaaaacttq 7080
taaattctgc tagaccctct qtaaattccg ctagaccttt qtqtqttttt tttqtttata 7140
ttcaagtggt tataatttat agaataaaga aagaataaaa aaagataaaa agaatagatc 7200
ccagccctqt qtataactca ctactttaqt caqttccqca qtattacaaa agqatqtcqc 7260
aaacgctgtt tgctcctcta caaaacagac cttaaaaccc taaaggctta aqtagcaccc 7320
tegeaagete qqqcaaateq etqaatatte ettttgtete egaceateaq geacetgagt 7380
cqctqtcttt ttcqtqacat tcaqttcqct qcqctcacqq ctctqqcaqt gaatgqgqgt 7440
aaatqqcact acaqqcqcct tttatqqatt catqcaaqqa aactacccat aatacaaqaa 7500
aaqcccqtca cqqqcttctc aqqqcqtttt atqqcqggtc tgctatgtgg tgctatctga 7560
ctttttgctg ttcagcagtt cctgccctct gattttccag tctgaccact tcggattatc 7620
ccqtqacaqq tcattcaqac tqqctaatqc acccaqtaaq qcaqcqqtat catcaacaqq 7680
cttacccqtc ttactqtcaa c
<210> 26
<211> 3888
<212> DNA
<213> Artificial Sequence
<220>
<223> plasmid
<400> 26
tgcgccgcta cagggcgcgt ccattcgcca ttcaggctgc gcaactgttg ggaagggcga 60
teggtgeggg cetetteget attacgeeag tttgggggtg agtteatgaa gtttegtege 120
agcqqcaqat tggtggactt aacaaattat ttgttaaccc atccgcacga gttaataccg 180
ctaacctttt tctctgagcg gtatgaatct gcaaaatcat cgatcagtga agatttaaca 240
attattaaac aaacctttga acagcagggg attggtactt tgcttactgt tcccggagct 300
```

```
qccqqaqqcq ttaaatatat tccqaaaatq aagcaggctq aagctqaaqa qtttqtqcag 360
acacttggac agtcgctggc aaatcctgag cgtatccttc cgggcggtta tgtatattta 420
acqqatatct taggaaagcc atctgtactc tccaaggtag ggaagctgtt tgcttccgtg 480
tttgcagage gegaaattga tgttgtcatg accgttgcca egaaaggcat ceetettgeg 540
tacgcagctg caagctattt gaatgtgcct gttgtgatcg ttcgtaaaga caataaggta 600
acagagggct ccacagtcag cattaattac gtttcaggct cctcaaaccg cattcaaaca 660
atgtcacttg cgaaaagaag catgaaaacg ggttcaaacg tactcattat tgatgacttt 720
atgaaagcag gcggcaccat taatggtatg attaacctgt tggatgagtt taacgcaaat 780
gtggcgggaa tcggcgtctt agttgaagcc gaaggagtag atgaacgtct tgttgacgaa 840
tatatqtcac ttcttactct ttcaaccatc aacatqaaaq aqaaqtccat tqaaattcaq 900
aatqqcaatt ttctqcqttt ttttaaaqac aatcttttaa aqaatqqaqa qacaqaatca 960
tgacaaaagc agtccacaca aaacatgccc cagcggcaat cgggccttat tcacaaggga 1020
ttatcgtcaa caatatgttt tacagctcag gccaaatccc tttgactcct tcaggcgaaa 1080
tggtgaatgg cgatattaag gagcagactc atcaagtatt cagcaattta aaggcggttc 1140
tggaagaagc gggtgcttct tttgaaacag ttgtaaaagc aactgtattt atcgcggata 1200
tggaacagtt tgcggaagta aacgaagtgt acggacaata ttttgacact cacaaaccgg 1260
cgagatcttg tgttgaagtc gcgagactcc cgaaggatgc gttagtcgag atcgaagtta 1320
ttgcactggt gaaataataa gaaaagtgat tctgggagag ccgggatcac ttttttattt 1380
accttatgcc cqaaatgaaa gctttatgac cctgcattaa tgaatcggcc aacgcgcggg 1440
qaqaqqqqt tiqqqtattq qqcqctcttc cqcttcctcq ctcactqact cqctqcqctc 1500
qqtcqttcqq ctqcqqcqaq cqqtatcaqc tcactcaaaq qcqqtaatac qqttatccac 1560
agaatcaggg gataacgcag gaaagaacat gtgagcaaaa ggccagcaaa aggccaggaa 1620
ccqtaaaaaq qccqcqttqc tqqcqttttt cqataqqctc cqccccctq acqaqcatca 1680
caaaaatcga cgctcaagtc agaggtggcg aaacccgaca ggactataaa gataccaggc 1740
qtttcccct qqaaqctccc tcqtqcgctc tcctqttccg accctqccgc ttaccqgata 1800
cctqtccqcc tttctccctt cqqqaaqcqt qqcqctttct cataqctcac qctqtagqta 1860
tctcagttcg gtgtaggtcg ttcgctccaa gctgggctgt gtgcacgaac cccccgttca 1920
qcccqaccqc tqcqccttat ccqqtaacta tcqtcttqaq tccaacccqq taaqacacqa 1980
cttatcqcca ctqqcaqcaq ccactqqtaa caqqattaqc aqaqcqaqqt atqtaqqcqg 2040
tgctacagaq ttcttgaagt gqtqqcctaa ctacqqctac actagaagga cagtatttgg 2100
tatctgcgct ctgctgaagc cagttacctt cggaaaaaga gttggtagct cttgatccgg 2160
caaacaaacc accgctggta gcggtggttt ttttgtttgc aagcagcaga ttacgcgcag 2220
aaaaaaagga totcaagaag atootttgat ottttotacg gggtotgacg otcagtggaa 2280
cgaaaactca cgttaaggga ttttggtcat gagattatca aaaaggatct tcacctagat 2340
ccttttaaat taaaaatgaa gttttaaatc aatctaaagt atatatgagt aaacttggtc 2400
tgacagttac caatgcttaa tcagtgaggc acctatctca gcgatctgtc tatttcgttc 2460
atccatagtt gcctgactcc ccgtcgtgta gataactacg atacgggagg gcttaccatc 2520
tggccccagt gctgcaatga taccgcgaga cccacgctca ccggctccag atttatcagc 2580
aataaaccag ccagccggaa gggccgagcg cagaagtggt cctgcaactt tatccgcctc 2640
catccagtct attaattgtt gccgggaagc tagagtaagt agttcgccag ttaatagttt 2700
gcgcaacgtt gttggcattg ctacaggcat cgtggtgtca cgctcgtcgt ttggtatggc 2760
ttcattcagc tccggttccc aacgatcaag gcgagttaca tgatccccca tgttgtgcaa 2820
aaaagcqqtt aqctccttcq qtcctccqat cqttqtcaga aqtaaqttgg ccqcaqtqtt 2880
atcactcatq gttatggcaq cactgcataa ttctcttact gtcatgccat ccgtaagatg 2940
cttttctgtg actggtgagt actcaaccaa gtcattctga gaataccgcg cccggcgacc 3000
gagttgctct tgcccggcgt caatacggga taatagtgta tgacatagca gaactttaaa 3060
agtgctcatc attggaaaac gttcttcggg gcgaaaactc tcaaggatct taccgctgtt 3120
gagatccagt tegatgtaac ccactegtge acceaactga tetteageat ettttaettt 3180
caccagcqtt tctqqqtqaq caaaaacaqq aaqqcaaaat qccqcaaaaa aqqqaataag 3240
qqcqacacqq aaatqttgaa tactcatact cttccttttt caatattatt gaagcattta 3300
tcagggttat tgtctcatga gcggatacat atttgaatgt atttagaaaa ataaacaaat 3360
aggggttccg cgcacatttc cccgaaaagt gccacctgta tgcggtgtga aataccgcac 3420
agatgcgtaa ggagaaata ccgcatcagg cgaaattgta aacgttaata ttttgttaaa 3480
attegegtta aatatttgtt aaateagete attttttaac caataggeeg aaateggeaa 3540
aatcccttat aaatcaaaag aatagaccga gatagggttg agtgttgttc cagtttggaa 3600
caagagtcca ctattaaaga acgtggactc caacgtcaaa gggcgaaaaa ccgtctatca 3660
gggcgatggc ccactacgtg aaccatcacc caaatcaagt tttttgcggt cgaggtgccg 3720
taaagctcta aatcqqaacc ctaaaqqqaq ccccqattt aqaqcttqac qqqqaaagcc 3780
ggcgaacgtg gcgagaaagg aagggaagaa agcgaaagga gcgggcgcta gggcgctggc 3840
aagtgtagcg gtcacgctgc gcgtaaccac cacacccgcc gcgcttaa
                                                                  3888
```

```
<210> 27
<211> 4606
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:plasmid
<400> 27
tgcgccgcta cagggcgcgt ccattcgcca ttcaggctgc gcaactgttg ggaagggcga 60
tcggtgcggg cctcttcgct attacgccag ctggcgaaag ggggatgtgc tgcaaggcga 120
ttaagttggg taacgccagg gttttcccag tcacgacgtt gtaaaacgac ggccagtgaa 180
ttgtaatacg actcactata gggcgaattg ggcccgacgt cgcatgctcc cggccgccat 240
qqccqcqqqa tqcqqccqcq tcqacqtqaa ataccqcaca qatqcqtaaq gagaaaatac 300
cgcatcaggc gataaaccca gcgaaccatt tgaggtgata ggtaagatta taccgaggta 360
tgaaaacgag aattggacct ttacagaatt actctatgaa gcgccatatt taaaaagcta 420
ccaagacgaa gaggatgaag aggatgagga ggcagattgc cttgaatata ttgacaatac 480
tgataagata atatatetti tatatagaag atategeegt atgtaaggat tteaggggge 540
aaggcatagg cagcgcgctt atcaatatat ctatagaatg ggcaaagcat aaaaacttgc 600
atggactaat gcttgaaacc caggacaata accttatagc ttgtaaattc tatcataatt 660
gtggtttcaa aatcggctcc gtcgatacta tgttatacgc caactttcaa aacaactttg 720
aaaaagctgt tttctggtat ttaaggtttt agaatgcaag gaacagtgaa ttggagttcg 780
tottqttata attaqcttct tqqqqtatct ttaaatactg tagaaaagag gaaggaaata 840
ataaatggct aaaatgagaa tatcaccgga attgaaaaaa ctgatcgaaa aataccgctg 900
cgtaaaagat acggaaggaa tgtctcctgc taaggtatat aagctggtgg gagaaaatga 960
aaacctatat ttaaaaatga cggacagccg gtataaaggg accacctatg atgtggaacg 1020
qqaaaaqqac atgatgctat ggctggaagg aaagctgcct gttccaaagg tcctgcactt 1080
tgaacggcat gatggctgga gcaatctgct catgagtgag gccgatggcg tcctttgctc 1140
ggaagagtat gaagatgaac aaagccctga aaagattatc gagctgtatg cggagtgcat 1200
caggetettt cactecateg acatategga ttgteectat acgaataget tagacageeg 1260
cttagccgaa ttggattact tactgaataa cgatctggcc gatgtggatt gcgaaaactg 1320
qqaaqaaqac actccattta aaqatccqcq cqaqctqtat qattttttaa agacggaaaa 1380
qcccqaaqaq qaacttqtct tttcccacqq cqacctqqqa qacaqcaaca tctttgtgaa 1440
aqatqqcaaa qtaaqtqqct ttattqatct tgggagaagc ggcagggcgg acaagtggta 1500
tgacattgcc ttctgcgtcc ggtcgatcag ggaggatatc ggggaagaac agtatgtcga 1560
actggatgaa ttgttttagt acctagattt agatgtctaa aaagctttaa ctacaagctt 1680
tttagacatc taatcttttc tgaagtacat ccgcaactgt ccatactctg atgttttata 1740
tcttttctaa aagttcgcta gataggggtc ccgagcgcct acgaggaatt tgtatcgcca 1800
ttcqccattc aqqctqcqca actqttggga agggcgatcg gtgcgggtac cgggatcact 1860
agtgcggccg cctgcaggtc gaccatatgg gagagctccc aacgcgttgg atgcatagct 1920
tgagtattct atagtgtcac ctaaatagct tggcgtaatc atggtcatag ctgtttcctg 1980
tgtgaaattg ttatccgctc acaattccac acaacatacg agccggaagc ataaagtgta 2040
aagcctgggg tgcctaatga gtgagctaac tcacattaat tgcgttgcgc tcactgcccg 2100
ctttccagtc gggaaacctg tcgtgccagc tgcattaatg aatcggccaa cgcgcgggga 2160
gaggeggttt gegtattggg egetetteeg etteeteget eaetgacteg etgegetegg 2220
tegttegget geggegageg gtateagete acteaaagge ggtaataegg ttateeacag 2280
aatcagggga taacgcagga aagaacatgt gagcaaaagg ccagcaaaag gccaggaacc 2340
gtaaaaaggc cgcgttgctg gcgtttttcg ataggctccg ccccctgac gagcatcaca 2400
aaaatcqacq ctcaaqtcaq aggtggcgaa acccgacagg actataaaga taccaggcgt 2460
ttccccctgg aagctccctc gtgcgctctc ctgttccgac cctgccgctt accggatacc 2520
tgtccgcctt tctcccttcg ggaagcgtgg cgctttctca tagctcacgc tgtaggtatc 2580
tcagttcggt gtaggtcgtt cgctccaagc tgggctgtgt gcacgaaccc cccgttcagc 2640
ccgaccgctg cgccttatcc ggtaactatc gtcttgagtc caacccggta agacacgact 2700
tatcgccact ggcagcagcc actggtaaca ggattagcag agcgaggtat gtaggcggtg 2760
ctacagagtt cttqaaqtqq tqgcctaact acggctacac tagaaggaca gtatttggta 2820
tctgcgctct gctgaagcca gttaccttcg gaaaaagagt tggtagctct tgatccggca 2880
aacaaaccac cgctggtagc ggtggttttt ttgtttgcaa gcagcagatt acgcgcagaa 2940
aaaaaqqatc tcaaqaaqat cctttqatct tttctacggg gtctqacgct cagtggaacg 3000
```

```
aaaactcacg ttaagggatt ttggtcatga gattatcaaa aaggatcttc acctagatcc 3060
ttttaaatta aaaatgaagt tttaaatcaa tctaaagtat atatgagtaa acttggtctg 3120
acagttacca atgcttaatc agtgaggcac ctatctcagc gatctgtcta tttcgttcat 3180
ccatagttgc ctgactcccc gtcgtgtaga taactacgat acgggagggc ttaccatctg 3240
qccccaqtqc tqcaatqata ccqcqaqacc cacqctcacc gqctccaqat ttatcaqcaa 3300
taaaccagcc agccggaagg gccgagcgca gaagtggtcc tgcaacttta tccgcctcca 3360
tecagtetat taattqttqc eqqqaaqeta qaqtaaqtaq tteqeeaqtt aataqtttqc 3420
gcaacqttqt tqqcattqct acaqqcatcq tqqtqtcacq ctcqtcqttt qqtatqqctt 3480
cattcagete eggtteceaa egatcaagge gagttacatg atcccccatg ttgtgcaaaa 3540
aaqcqqttaq ctccttcqqt cctccqatcq ttqtcaqaaq taaqttqqcc qcaqtqttat 3600
cactcatggt tatggcagca ctgcataatt ctcttactgt catgccatcc gtaagatgct 3660
tttctqtqac tqqtqaqtac tcaaccaagt cattctqaqa ataccqcqcc cqqcqaccqa 3720
gttgctcttg cccggcgtca atacgggata atagtgtatg acatagcaga actttaaaag 3780
tgctcatcat tggaaaacgt tcttcggggc gaaaactctc aaggatctta ccgctgttga 3840
gatccagttc gatgtaaccc actcgtgcac ccaactgatc ttcagcatct tttactttca 3900
ccagcgtttc tgggtgagca aaaacaggaa ggcaaaatgc cgcaaaaaag ggaataaggg 3960
cgacacggaa atgttgaata ctcatactct tcctttttca atattattga agcatttatc 4020
agggttattg tctcatgagc ggatacatat ttgaatgtat ttagaaaaaat aaacaaatag 4080
gggttccgcg cacatttccc cgaaaagtgc cacctgtatg cggtgtgaaa taccgcacag 4140
atgcgtaagg agaaaatacc gcatcaggcg aaattgtaaa cgttaatatt ttgttaaaat 4200
tcgcgttaaa tatttgttaa atcagctcat tttttaacca ataggccgaa atcggcaaaa 4260
tcccttataa atcaaaagaa tagaccgaga tagggttgag tgttgttcca gtttggaaca 4320
agagtccact attaaagaac gtggactcca acgtcaaagg gcgaaaaacc gtctatcagg 4380
gcgatggccc actacgtgaa ccatcaccca aatcaagttt tttgcggtcg aggtgccgta 4440
aagctctaaa tcggaaccct aaagggagcc cccgatttag agcttgacgg ggaaagccgg 4500
cgaacgtggc gagaaaggaa gggaagaaag cgaaaggagc gggcgctagg gcgctggcaa 4560
gtgtagcggt cacgctgcgc gtaaccacca cacccgccgc gcttaa
                                                                  4606
<210> 28
<211> 5399
<212> DNA
<213> Artificial Sequence
<223> Description of Artificial Sequence:plasmid
<400> 28
tgcgccgcta cagggcgcgt ccattcgcca ttcaggctgc gcaactgttg ggaagggcga 60
teggtgeggg cetetteget attacgceag tttgggggtg agtteatgaa gtttegtege 120
agcggcagat tggtggactt aacaaattat ttgttaaccc atccgcacga gttaataccg 180
ctaacctttt tctctgagcg gtatgaatct gcaaaatcat cgatcagtga agatttaaca 240
attattaaac aaacctttga acagcagggg attggtactt tgcttactgt tcccggagct 300
gccggaggcg ttaaatatat tccgaaaatg aagcaggctg aagctgaaga gtttgtgcag 360
acacttggac agtcgctggc aaatcctgag cgtatccttc cgggcggtta tgtatattta 420
acggatatet taggaaagee atetgtaete teeaaggtag ggaagetgtt tgetteegtg 480
tttgcagagc gcgaaattga tgttgtcatg accgttgcca cgaaaggcat ccctcttgcg 540
tacgcagctg cggccgcgtc gacaaaccca gtgaaccatt tgaggtgata ggtaagatta 600
taccgaggta tgaaaacgag aattggacct ttacagaatt actctatgaa gcgccatatt 660
taaaaaqcta ccaaqacgaa qaqqatqaaq aqqatqaqqa qqcaqattqc cttqaatata 720
ttgacaatac tgataagata atatatcttt tatatagaag atatcgccgt atgtaaggat 780
ttcagggggc aaggcatagg cagcgcgtt atcaatatat ctatagaatg ggcaaagcat 840
aaaaacttgc atggactaat gcttgaaacc caggacaata accttatagc ttgtaaattc 900
tatcataatt gtggtttcaa aatcggctcc gtcgatacta tgttatacgc caactttcaa 960
aacaactttg aaaaagctgt tttctggtat ttaaggtttt agaatgcaag gaacagtgaa 1020
ttggagttcg tcttgttata attagcttct tggggtatct ttaaatactg tagaaaagag 1080
gaaggaaata ataaatggct aaaatgagaa tatcaccgga attgaaaaaa ctgatcgaaa 1140
aataccgctg cgtaaaagat acggaaggaa tgtctcctgc taaggtatat aagctggtgg 1200
gagaaaatga aaacctatat ttaaaaatga cggacagccg gtataaaggg accacctatg 1260
atgtggaacg ggaaaaggac atgatgctat ggctggaagg aaagctgcct gttccaaagg 1320
tcctgcactt tqaacqqcat qatqqctqqa qcaatctqct catqaqtqaq qccqatqqcq 1380
```

```
tcctttqctc qqaaqaqtat qaaqatgaac aaagccctga aaagattatc qagctqtatg 1440
cqqaqtqcat caqqctcttt cactccatcq acatatcgga ttqtccctat acqaatagct 1500
taqacagccg cttagccgaa ttggattact tactgaataa cgatctggcc gatgtggatt 1560
qcqaaaactq qqaaqaaqac actccattta aagatccgcg cgagctgtat gattttttaa 1620
agacggaaaa gcccgaagag gaacttgtct tttcccacgg cgacctggga gacagcaaca 1680
tctttgtgaa agatggcaaa gtaagtggct ttattgatct tgggagaagc ggcagggcgg 1740
acaagtggta tgacattgcc ttctgcgtcc ggtcgatcag ggaggatatc ggggaagaac 1800
attatatttt actggatgaa ttgttttagt acctagattt agatgtctaa aaagctttaa 1920
ctacaagett tttagacate taatetttte tgaagtacat eegcaactgt ecatactetg 1980
atgttttata tcttttctaa aagttcgcta gataggggtc ccgagcgcct acgaggaatt 2040
tgtatcacca ggtaccagct gcaagctatt tgaatgtgcc tgttgtgatc gttcgtaaag 2100
acaataaggt aacagagggc tccacagtca gcattaatta cgtttcaggc tcctcaaacc 2160
gcattcaaac aatgtcactt gcgaaaagaa gcatgaaaac gggttcaaac gtactcatta 2220
ttgatgactt tatgaaagca ggcggcacca ttaatggtat gattaacctg ttggatgagt 2280
ttaacgcaaa tgtggcggga atcggcgtct tagttgaagc cgaaggagta gatgaacgtc 2340
ttgttgacga atatatgtca cttcttactc tttcaaccat caacatgaaa gagaagtcca 2400
ttgaaattca gaatggcaat tttctgcgtt tttttaaaga caatctttta aagaatggag 2460
agacagaatc atgacaaaag cagtccacac aaaacatgcc ccagcggcaa tcgggcctta 2520
ttcacaaggg attatcgtca acaatatgtt ttacagctca ggccaaatcc ctttgactcc 2580
ttcaggcgaa atggtgaatg gcgatattaa ggagcagact catcaagtat tcagcaattt 2640
aaaggcggtt ctggaagaag cgggtgcttc ttttgaaaca gttgtaaaag caactgtatt 2700
tatcgcggat atggaacagt ttgcggaagt aaacgaagtg tacggacaat attttgacac 2760
tcacaaaccg gcgagatctt gtgttgaagt cgcgagactc ccgaaggatg cgttagtcga 2820
gatcgaagtt attgcactgg tgaaataata agaaaagtga ttctgggaga gccgggatca 2880
cttttttatt taccttatgc ccgaaatgaa agctttatga ccctgcatta atgaatcggc 2940
caacgcgcgg ggagaggcgg tttgcgtatt gggcgctctt ccgcttcctc gctcactgac 3000
tegetgeget eggtegtteg getgeggega geggtateag eteaeteaaa ggeggtaata 3060
cggttatcca cagaatcagg ggataacgca ggaaagaaca tgtgagcaaa aggccagcaa 3120
aaqqccaqqa accqtaaaaa qqccqcqttq ctqqcqtttt tcqataqqct ccqccccct 3180
gacgagcatc acaaaaatcq acqctcaagt cagaggtggc gaaacccgac aggactataa 3240
agataccagg cgtttccccc tggaagctcc ctcgtgcgct ctcctgttcc gaccctgccg 3300
cttaccggat acctgtccgc ctttctccct tcgggaagcg tggcgctttc tcatagctca 3360
cgctgtaggt atctcagttc ggtgtaggtc gttcgctcca agctgggctg tgtgcacgaa 3420
ccccccgttc agcccgaccg ctgcgcctta tccggtaact atcgtcttga gtccaacccg 3480
gtaagacacg acttatcgcc actggcagca gccactggta acaggattag cagagcgagg 3540
tatgtaggcg gtgctacaga gttcttgaag tggtggccta actacggcta cactagaagg 3600
acagtatttg gtatctgcgc tctgctgaag ccagttacct tcggaaaaag agttggtagc 3660
tettgateeg geaaacaaac cacegetggt ageggtggtt tttttgtttg caageageag 3720
attacgcgca gaaaaaaagg atctcaagaa gatcctttga tcttttctac ggggtctgac 3780
gctcagtgga acgaaaactc acgttaaggg atttttggtca tgagattatc aaaaaggatc 3840
ttcacctaga tccttttaaa ttaaaaatga agttttaaat caatctaaag tatatatgag 3900
taaacttggt ctgacagtta ccaatgetta atcagtgagg cacctatete agegatetgt 3960
ctatttcgtt catccatagt tgcctgactc cccgtcgtgt agataactac gatacgggag 4020
ggcttaccat ctggccccag tgctgcaatg ataccgcgag acccacgctc accggctcca 4080
qatttatcaq caataaacca qccaqccqqa aqqqccqaqc qcaqaaqtqq tcctqcaact 4140
ttatccgcct ccatccagtc tattaattgt tgccgggaag ctagagtaag tagttcgcca 4200
gttaatagtt tgcgcaacgt tgttggcatt gctacaggca tcgtggtgtc acgctcgtcg 4260
tttggtatgg cttcattcag ctccggttcc caacgatcaa ggcgagttac atgatccccc 4320
atgttgtgca aaaaagcggt tagctccttc ggtcctccga tcgttgtcag aagtaagttg 4380
gccgcagtgt tatcactcat ggttatggca gcactgcata attctcttac tgtcatgcca 4440
tccgtaagat gcttttctgt gactggtgag tactcaacca agtcattctg agaataccgc 4500
gcccggcgac cgagttgctc ttgcccggcg tcaatacggg ataatagtgt atgacatagc 4560
agaactttaa aagtgeteat cattggaaaa egttettegg ggegaaaact etcaaggate 4620
ttaccgctgt tgagatccag ttcgatgtaa cccactcgtg cacccaactg atcttcagca 4680
tcttttactt tcaccagcqt ttctqqqtqa qcaaaaacaq qaaqqcaaaa tqccqcaaaa 4740
aagggaataa gggcgacacg gaaatgttga atactcatac tcttcctttt tcaatattat 4800
tgaaqcattt atcagggtta ttgtctcatg agcggataca tatttgaatg tatttagaaa 4860
aataaacaaa taggggttcc gcgcacattt ccccgaaaaq tgccacctgt atgcggtgtg 4920
aaataccgca cagatgcgta aggagaaaat accgcatcag gcgaaattgt aaacgttaat 4980
```

```
attttqttaa aattcgcgtt aaatatttqt taaatcagct cattttttaa ccaataggcc 5040
qaaatcggca aaatccctta taaatcaaaa gaatagaccg agatagggtt gagtgttgtt 5100
ccagttttgga acaagagtcc actattaaag aacgtggact ccaacgtcaa agggcgaaaa 5160
acceptctate agggegatgg eccaetacet gaaccateae ecaaatcaag ttttttgegg 5220
tcgaggtgcc gtaaagctct aaatcggaac cctaaaggga gcccccgatt tagagcttga 5280
cggggaaagc cggcgaacgt ggcgagaaag gaagggaaga aagcgaaagg agcgggcgct 5340
agggcqctqq caaqtqtaqc gqtcacqctq cqcqtaacca ccacacccqc cqcqcttaa 5399
<210> 29
<211> 6805
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:plasmid
<400> 29
ttgcggccgc ttcgaaagct gtaatataaa aaccttcttc aactaacggg gcaggttagt 60
qacattagaa aaccgactgt aaaaagtaca gtcggcatta tctcatatta taaaagccag 120
tcattaggcc tatctgacaa ttcctgaata gagttcataa acaatcctgc atgataacca 180
tcacaaacag aatgatgtac ctgtaaagat agcggtaaat atattgaatt acctttatta 240
atgaattttc ctgctgtaat aatgggtaga aggtaattac tattattatt gatatttaag 300
ttaaacccaq taaatqaaqt ccatqqaata ataqaaaqaq aaaaaqcatt ttcaqqtata 360
qqtqttttqq qaaacaattt ccccqaacca ttatatttct ctacatcaga aaggtataaa 420
tcataaaact ctttgaagtc attctttaca ggagtccaaa taccagagaa tgttttagat 480
acaccatcaa aaattgtata aagtggctct aacttatccc aataacctaa ctctccgtcg 540
ctattqtaac caqttctaaa aqctqtattt qaqtttatca cccttqtcac taaqaaaata 600
aatgcagggt aaaatttata teettettgt tttatgttte ggtataaaac actaatatea 660
atttctgtgg ttatactaaa agtcgtttgt tggttcaaat aatgattaaa tatctctttt 720
ctcttccaat tgtctaaatc aattttatta aagttcattt gatatgcctc ctaaattttt 780
atctaaagtg aatttaggag gettaettgt etgetttett eattagaate aatcettttt 840
taaaagtcaa tattactgta acataaatat atattttaaa aatatcccac tttatccaat 900
tttcgtttgt tgaactaatg ggtgctttag ttgaagaata aagaccacat taaaaaatgt 960
ggtcttttgt gtttttttaa aggatttgag cgtagcgaaa aatccttttc tttcttatct 1020
tgataataag ggtaactatt gaattcggta ccaaqagttt gtagaaacgc aaaaaggcca 1080
teegteagga tggcettetg ettaatttga tgeetggeag tttatggegg gegteetgee 1140
cqccaccete cqqqccqttq cttcqcaacq ttcaaatccq ctcccqqcqq atttqtccta 1200
ctcaggagag cgttcaccga caaacaacag ataaaacgaa aggcccagtc tttcgactga 1260
gcctttcgtt ttatttgatg cctggcagtt ccctactctc gcatggggag accccacact 1320
accateggeg ctaeggegtt teacttetga gtteggeatg gggteaggtg ggaceaeege 1380
gctactgccg ccaggcaaat tctgttttat cagaccgctt ctgcgttctg atttaatctg 1440
tatcaggctg aaaatcttct ctcatccgcc aaaacaggat ccaattatgg cagatcaatg 1500
agetteacag acacaatate agggacattt gttagttett teacaatttt atetteeaga 1560
tgtctgtcaa aggaaagcat catgatggct tctccgcctt tttccttacg gccaacctgc 1620
atagttgcaa tgttaatatc attatctccg agaatacgtc ctactcggcc gatgacacct 1680
gttgtatctt gatgctggat atacaccaag tgaccagtcg gataaaaatc aatattaaat 1740
ccattgatct cgacaattcg ttctccgaaa tgaggaatat acgtagccgt tacagtaaag 1800
gtgctgcggt ctcctgtcac ttttacgctg atgcagttat cgtatccaga ttcagaagag 1860
gaaatttttt cactgaagct aatgccgcgt tcttttgcga cacccccggc attgacctca 1920
ttaacagtag agtctacgcg cggttttaaa aagcctgaca gaagggcttt tgtaatgaac 1980
gatgtttcaa gtttagcaat tgtgccttca tattgaatgg caacatcctg tactggttct 2040
ttcatqcact qtqatacaaq qctqccaatt tttcctqcaa tttqatqqta aqqcttaatt 2100
ttagcaaatt catcttttgt catggcaggc aggttgatag ctgacatgac aggcaggcct 2160
tttgcgaact gcagaacttc ttctgacact tgggcggcga cattgagctg tgcttctttc 2220
gttgatgctc ccaagtgagg agtggcaatg actaatggat gatcaacaag tttgttgtca 2280
actggcggtt cgacttcgaa aacgtcaagc gctgctcccg caacatgccc gttttccaaa 2340
gcttcgagaa gtgctgcttc atcgataatt ccgcctcgcg cacagttaat taagcgaacg 2400
ccttttttcg tttttqcaat cqtttcttta ttcaataaqc cttttqtttc ttttqttaaa 2460
ggcgtgtgaa cggtaatgat atccgcactt tcaagcactt cttcaaatgt acggctgttt 2520
acgccgattt ttttcgctct ttcttccgtt aagaaaggat caaaaacgtg cacagtcata 2580
```

```
ccgaacgctc ctcgacgctg tgcaatttca cttccgattc ggcctaatcc tacaatacca 2640
agogtttttc cataaagctc tgaaccgaca taagctgtgc ggttccactc tctggatttc 2700
actgagatat tagcctgcgg aatgtgtctc attaaagaag agatcattgc aaatgtatgc 2760
tcagctgtcg aaatggtgtt gccgttcgga gcattgatca cgattacccc gtgtttcgta 2820
qcctcatcaa tatcgatatt atcgacaccg acaccggctc ttccgacaat ttttaaagaa 2880
gtcattttgt tgaaaaggtc ttctgttact tttgtcgcgc ttcgcaccaa aagagcatca 2940
aaagtatgta attcatcttc tgcatctgct acgttttttt gaacgatttc aataaagtct 3000
gattcaataa gtggctgtaa accgtcgttg ctcattttgt ctgagaccaa tactcgaaac 3060
atgttttctc ctcctctaga gcgtcctgct gttgttaaga ttattatacc acaccttgta 3120
gataaagtca acaacttttt gcaaaatttt tcaggaattt tagcagaggt tgttctggat 3180
gtagaacaaa acatetttee getettgtge tgttaggata tetttettgg aagetaggta 3240
ggcctcgagt tatggcagtt ggttaaaagg aaacaaaaag accgttttca cacaaaacgg 3300
tctttttcga tttcttttta caqtcacagc cacttttgca aaaaccggac agcttcatgc 3360
cttataactg ctgtttcggt cgacctgcag gcatgcaagc ttcgcgaagc ggccgccgac 3420
gcgaggetgg atggcettce ccattatgat tetteteget teeggeggea tegggatgee 3480
cgcgttgcag gccatgctgt ccaggcaggt agatgacgac catcagggac agcttcaagg 3540
atcgctcgcg gctcttacca gcctaacttc gatcactgga ccgctgatcg tcacggcgat 3600
ttatgccgcc tcggcgagca catggaacgg gttggcatgg attgtaggcg ccgccctata 3660
cettgtetge eteceegegt tgegtegegg tgeatggage egggeeacet egacetgaat 3720
ggaagccggc ggcacctcgc taacggattc accactccaa gaattggagc caatcaattc 3780
ttgcggagaa ctgtgaatgc gcaaaccaac ccttggcaga acatatccat cgcgtccgcc 3840
atotocagea geogeaegeg gegeateteg ggeagegttg ggteetggee aegggtgege 3900
atgategtge teetgtegtt gaggaceegg etaggetgge ggggttgeet taetggttag 3960
caqaatqaat caccqatacq cqaqcqaacq tqaaqcqact qctqctqcaa aacqtctqcq 4020
acctgagcaa caacatgaat ggtcttcggt ttccgtgttt cgtaaagtct ggaaacgcgg 4080
aagtcagege cetgeaceat tatgtteegg atetgeateg caggatgetg etggetacee 4140
tgtggaacac ctacatctgt attaacgaag cgctggcatt gaccctgagt gatttttctc 4200
tggtcccgcc gcatccatac cgccagttgt ttaccctcac aacgttccag taaccgggca 4260
tgttcatcat cagtaacccg tatcgtgagc atcctctct gtttcatcgg tatcattacc 4320
cccatgaaca gaaattcccc cttacacgga ggcatcaagt gaccaaacag gaaaaaaccg 4380
cccttaacat ggcccgcttt atcagaagcc agacattaac gcttctggag aaactcaacg 4440
agctggacgc ggatgaacag gcagacatct gtgaatcgct tcacgaccac gctgatgagc 4500
tttaccgcag ctgcctcgcg cgtttcggtg atgacggtga aaacctctga cacatgcagc 4560
tcccggagac ggtcacagct tgtctgtaag cggatgccgg gagcagacaa gcccgtcagg 4620
gegegteage gggtgttgge gggtgteggg gegeageeat gaeceagtea egtagegata 4680
gcggagtgta tactggctta actatgcggc atcagagcag attgtactga gagtgcacca 4740
tatgcggtgt gaaataccgc acagatgcgt aaggagaaaa taccgcatca ggcgctcttc 4800
cgcttcctcg ctcactgact cgctgcgctc ggtcgttcgg ctgcggcgag cggtatcagc 4860
tcactcaaag gcggtaatac ggttatccac agaatcaggg gataacgcag gaaagaacat 4920
gtgagcaaaa ggccagcaaa aggccaggaa ccgtaaaaag gccgcgttgc tggcgttttt 4980
ccataggete egececety acqageatea caaaaatega egeteaagte agaggtggeg 5040
aaacccgaca ggactataaa gataccaggc gtttccccct ggaagctccc tcgtgcgctc 5100
tectgtteeg accetgeege ttaceggata cetgteegee tttetecett egggaagegt 5160
ggcgctttct catagctcac gctgtaggta tctcagttcg gtgtaggtcg ttcgctccaa 5220
gctgggctgt gtgcacgaac cccccgttca gcccgaccgc tgcgccttat ccggtaacta 5280
tegtettgag tecaaceegg taagacaega ettategeea etggeageag ceaetggtaa 5340
caggattagc agagcgaggt atgtaggcgg tgctacagag ttcttgaagt ggtggcctaa 5400
ctacggctac actagaagga cagtatttgg tatctgcgct ctgctgaagc cagttacctt 5460
cggaaaaaga gttggtagct cttgatccgg caaacaaacc accgctggta gcggtggttt 5520
ttttgtttgc aagcagcaga ttacgcgcag aaaaaaagga tctcaagaag atcctttgat 5580
cttttctacg gggtctgacg ctcagtggaa cgaaaactca cgttaaggga ttttggtcat 5640
gagattatca aaaaggatct tcacctagat ccttttaaat taaaaatgaa gttttaaatc 5700
aatctaaagt atatatgagt aaacttggtc tgacagttac caatgcttaa tcagtgaggc 5760
acctatctca gcgatctgtc tatttcgttc atccatagtt gcctgactcc ccgtcgtgta 5820
gataactacg atacgggagg gettaccate tggccccagt getgcaatga taccgcgaga 5880
cccacgctca ccggctccag atttatcagc aataaaccag ccagccggaa gggccgagcg 5940
cagaagtggt cctqcaactt tatccqcctc catccaqtct attaattqtt qccqqqaaqc 6000
tagagtaagt agttcgccag ttaatagttt gcgcaacgtt gttgccattg ctgcaggcat 6060
cgtggtgtca cgctcgtcgt ttggtatggc ttcattcagc tccggttccc aacgatcaag 6120
gcgagttaca tgatcccca tgttgtgcaa aaaagcggtt agctccttcg gtcctccgat 6180
```

```
cgttgtcaga agtaagttgg ccgcagtgtt atcactcatg gttatggcag cactgcataa 6240
ttctcttact qtcatqccat ccqtaaqatq cttttctqtq actqqtqaqt actcaaccaa 6300
gtcattctga gaatagtgta tgcggcgacc gagttgctct tgcccggcgt caatacggga 6360
taataccqcq ccacataqca qaactttaaa agtgctcatc attggaaaac gttcttcggg 6420
gcgaaaactc tcaaggatct taccgctgtt gagatccagt tcgatgtaac ccactcgtgc 6480
acceaactga tetteageat ettttaettt caccagegtt tetgggtgag caaaaacagg 6540
aaggcaaaat gccgcaaaaa agggaataag ggcgacacgg aaatgttgaa tactcatact 6600
cttccttttt caatattatt qaaqcattta tcaqqqttat tgtctcatga gcggatacat 6660
atttqaatqt atttaqaaaa ataaacaaat aggggttccg cgcacatttc cccgaaaagt 6720
qccacctgac qtctaaqaaa ccattattat catgacatta acctataaaa ataggcgtat 6780
                                                                  6805
cacqaqqccc tttcqtcttc aaqaa
<210> 30
<211> 5983
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:plasmid
tgcgccgcta cagggcgcgt ccattcgcca ttcaggctgc gcaactgttg ggaagggcga 60
tcqqtqcqqq cctcttcqct attacqccaq ctqqcqaaaq qqqqatqtqc tqcaaggcqa 120
ttaaqttqqq taacqccaqq qttttcccaq tcacqacqtt qtaaaacqac ggccaqtgaa 180
ttgtaatacg actcactata gggcgaattg ggcccgacgt cgcatgctcc cggccgccat 240
ggccgcggga tatcactagt gcggccgcct gcaggtcgac catatgggag agcccggatc 300
caattatqqc aqatcaatqa qcttcacaqa cacaatatca gggacatttg ttagttcttt 360
cacaatttta tcttccagat gtctgtcaaa ggaaagcatc atgatggctt ctccgccttt 420
ttccttacgg ccaacctgca tagttgcaat gttaatatca ttatctccga gaatacgtcc 480
tactcggccg atgacacctg ttgtatcttg atgctggata tacaccaagt gaccagtcgg 540
ataaaaatca atattaaatc cattgatctc gacaattcgt tctccgaaat gaggaatata 600
cgtagccgtt acagtaaagg tgctgcggtc tcctgtcact tttacgctga tgcagttatc 660
gtatccagat tcagaagagg aaattttttc actgaagcta atgccgcgtt cttttgcgac 720
acccccggca ttgacctcat taacagtaga gtctacgcgc ggttttaaaa agcctgacag 780
aagggctttt gtaatgaacg atgtttcaag tttagcaatt gtgccttcat attgaatggc 840
aacatcctgt actggttctt tcatgcactg tgatacaagg ctgccaattt ttcctgcaat 900
ttgatggtaa ggcttaattt tagcaaattc atcttttgtc atggcaggca ggttgatagc 960
tgacatgaca ggcaggcctt ttgcgaactg cagaacttct tctgacactt gggcggcgac 1020
attgagetgt gettettteg ttgatgetee caagtgagga gtggeaatga etaatggatg 1080
atcaacaagt ttgttgtcaa ctggcggttc gacttcgaaa acqtcaagcg ctgctcccqc 1140
aacatgcccg ttttccaaag ctttttagac atctaaatct aggtactaaa acaattcatc 1200
caqtaaaata taatattta ttttctccca atcaqqcttg atccccaqta agtcaaaaaa 1260
tagetegaca tactqttett eccegatate etceetgate gaceggaege agaaggeaat 1320
qtcataccac ttqtccqccc tqccqcttct cccaagatca ataaaqccac ttactttqcc 1380
atctttcaca aaqatqttqc tqtctcccag gtcqccqtgg gaaaagacaa gttcctcttc 1440
gggcttttcc gtctttaaaa aatcatacag ctcgcgcgga tctttaaatg gagtgtcttc 1500
ttcccaqttt tcqcaatcca catcqqccaq atcqttattc aqtaaqtaat ccaattcqqc 1560
taagcggctg tctaagctat tcgtataggg acaatccgat atgtcgatgg agtgaaagag 1620
cctgatgcac tccgcataca gctcgataat cttttcaggg ctttgttcat cttcatactc 1680
ttccqagcaa aggacqccat cggcctcact catgagcaga ttgctccagc catcatgccg 1740
ttcaaagtgc aggacetttg gaacaggcag ettteettee agecatagea teatgteett 1800
ttcccgttcc acatcatagg tggtcccttt ataccggctg tccgtcattt ttaaatatag 1860
qttttcattt tctcccacca gcttatatac cttagcagga gacattcctt ccgtatcttt 1920
tacgcagcgg tatttttcga tcagtttttt caattccggt gatattctca ttttagccat 1980
ttattatttc cttcctcttt tctacagtat ttaaagatac cccaagaagc taattataac 2040
aagacgaact ccaattcact gttccttgca ttctaaaacc ttaaatacca gaaaacagct 2100
ttttcaaaqt tqttttqaaa qttqqcqtat aacataqtat cqacqqaqcc gattttgaaa 2160
ccacaattat gatagaattt acaagctata aggttattgt cctgggtttc aagcattagt 2220
ccatgcaagt ttttatgctt tgcccattct atagatatat tgataagcgc gctgcctatg 2280
```

```
ccttqccccc tqaaatcctt acatacqqcq atatcttcta tataaaaqat atattatctt 2340
atcagtattg tcaatatatt caaggcaatc tgcctcctca tcctcttcat cctcttcgtc 2400
ttggtagctt tttaaatatg gcgcttcata gagtaattct gtaaaggtcc aattctcgtt 2460
ttcatacctc ggtataatct tacctatcac ctcaaatggt tcgctgggtt tatcgcctga 2520
tgcqqtattt tctccttacg catctqtgcg gtatttcacg tcgacgcggc cgccatggcc 2580
gegggatece ggtacegaaa categttaga ttteeteeta aattgacaaa etaaatatet 2640
gataatttaa catattctca aaagagtgtc aacgtgtatt gacgcagtaa aggataaaag 2700
taaagcctaa taaatcaatg atctgacagc ttgcaggtaa tatatttaat ttgaagcaat 2760
tetetataca gecaaceagt tategtttat aatgtaatta aattteatat gateaatett 2820
cggggcaggg tgaaattccc taccggcggt gatgagccaa tggctctaag cccgcgagct 2880
gtctttacag caggattcgg tgagattccg gagccgacag tacagtctgg atgggagaag 2940
atggaggttc ataagcgttt tgaaattgaa tttttcaaac gtttctttgc ctagcctaat 3000
tttcgaaacc ccgcttttat atatgaagcg gtttttttat tggctggaaa agaacctttc 3060
cgttttcgag taagatgtga tcgaaaagga gagaatgaag tgaaagtaaa aaaattagtt 3120
gtggtcagca tgctgagcag cattgcattt gttttgatgc tgttaaattt cccgtttccg 3180
ggtcttccgg attatttaaa aatcgatttt agcgacgttc ccgcaattat tgccattctg 3240
atttacggac ctttggcggg atcactagag ggctcccaac gcgttggatg catagcttga 3300
gtattctata gtgtcaccta aatagcttgg cgtaatcatg gtcatagctg tttcctgtgt 3360
gaaattgtta tccgctcaca attccacaca acatacgagc cggaagcata aagtgtaaag 3420
cctggggtgc ctaatgagtg agctaactca cattaattgc gttgcgctca ctgcccgctt 3480
tccagtcggg aaacctgtcg tgccagctgc attaatgaat cggccaacgc gcggggagag 3540
geggtttgeg tattgggege tetteegett cetegeteae tgaetegetg egeteggteg 3600
ttcggctgcg gcgagcggta tcagctcact caaaggcggt aatacggtta tccacagaat 3660
caggggataa cgcaggaaag aacatgtgag caaaaggcca gcaaaaggcc aggaaccgta 3720
aaaaggccgc gttgctggcg tttttcgata ggctccgccc ccctgacgag catcacaaaa 3780
atcgacgctc aagtcagagg tggcgaaacc cgacaggact ataaagatac caggcgtttc 3840
cccctggaag ctccctcgtg cgctctcctg ttccgaccct gccgcttacc ggatacctgt 3900
ccgcctttct cccttcggga agcgtggcgc tttctcatag ctcacgctgt aggtatctca 3960
qttcggtgta ggtcgttcgc tccaagctgg gctgtgtgca cgaacccccc gttcagcccg 4020
accyctycyc cttatccyyt aactatcytc ttyaytccaa cccyytaaga cacyacttat 4080
cgccactggc agcagccact ggtaacagga ttagcagagc gaggtatgta ggcggtgcta 4140
caqaqttctt qaaqtqqtqq cctaactacq qctacactaq aaqqacaqta tttqqtatct 4200
gcgctctgct gaagccagtt accttcggaa aaagagttgg tagctcttga tccggcaaac 4260
aaaccaccgc tggtagcggt ggtttttttg tttgcaagca gcagattacg cgcagaaaaa 4320
aaggatetea agaagateet ttgatetttt etaeggggte tgaegeteag tggaaegaaa 4380
actcacgtta agggattttg gtcatgagat tatcaaaaag gatcttcacc tagatccttt 4440
taaattaaaa atgaagtttt aaatcaatct aaagtatata tgagtaaact tggtctgaca 4500
qttaccaatg cttaatcagt gaggcaccta tctcagcgat ctgtctattt cgttcatcca 4560
tagttqcctq actccccqtc qtqtaqataa ctacqatacq qqaqqqctta ccatctqgcc 4620
ccagtgctgc aatgataccg cgagacccac gctcaccggc tccagattta tcagcaataa 4680
accaqccaqc cqqaaqqqcc qaqcqcaqaa qtqqtcctqc aactttatcc qcctccatcc 4740
agtctattaa ttgttgccgg gaagctagag taagtagttc gccagttaat agtttgcgca 4800
acqttqttqq cattqctaca qqcatcqtqq tqtcacqctc qtcqtttqqt atqqcttcat 4860
tcagetccgg ttcccaacga tcaaggcgag ttacatgatc ccccatgttg tgcaaaaaaag 4920
cggttagctc cttcggtcct ccgatcgttg tcagaagtaa gttggccgca gtgttatcac 4980
tcatggttat ggcagcactg cataattctc ttactgtcat gccatccgta agatgctttt 5040
ctgtgactgg tgagtactca accaagtcat tctgagaata ccgcgcccgg cgaccgagtt 5100
gctcttgccc ggcgtcaata cgggataata gtgtatgaca tagcagaact ttaaaagtgc 5160
tcatcattgg aaaacgttct tcggggcgaa aactctcaag gatcttaccg ctgttgagat 5220
ccagttcgat gtaacccact cgtgcaccca actgatcttc agcatctttt actttcacca 5280
gcgtttctgg gtgagcaaaa acaggaaggc aaaatgccgc aaaaaaggga ataagggcga 5340
cacggaaatg ttgaatactc atactcttcc tttttcaata ttattgaagc atttatcagg 5400
gttattgtct catgagcgga tacatatttg aatgtattta gaaaaataaa caaatagggg 5460
ttccgcgcac atttccccga aaagtgccac ctgtatgcgg tgtgaaatac cgcacagatg 5520
cgtaaggaga aaataccgca tcaggcgaaa ttgtaaacgt taatattttg ttaaaattcg 5580
cgttaaatat ttgttaaatc agctcatttt ttaaccaata ggccgaaatc ggcaaaatcc 5640
cttataaatc aaaagaatag accgagatag ggttgagtgt tgttccagtt tggaacaaga 5700
gtccactatt aaagaacgtg gactccaacg tcaaagggcg aaaaaccgtc tatcagggcg 5760
atggcccact acgtgaacca tcacccaaat caagtttttt gcggtcgagg tgccgtaaag 5820
ctctaaatcg gaaccctaaa gggagcccc gatttagagc ttgacgggga aagccggcga 5880
```

```
acgtggcgag aaaggaaggg aagaaagcga aaggagcggg cgctagggcg ctggcaagtg 5940
tagcggtcac gctgcgcgta accaccacac ccgccgcgct taa
<210> 31
<211> 7330
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence:plasmid
<400> 31
ttqcqqccqc ttcqaaaqct qtaatataaa aaccttcttc aactaacggg gcaggttagt 60
gacattagaa aaccgactgt aaaaagtaca gtcggcatta tctcatatta taaaagccag 120
tcattaggcc tatctgacaa ttcctgaata gagttcataa acaatcctgc atgataacca 180
tcacaaacag aatgatgtac ctgtaaagat agcggtaaat atattgaatt acctttatta 240
atqaattttc ctgctgtaat aatqggtaga aggtaattac tattattatt gatatttaag 300
ttaaacccaq taaatqaaqt ccatqqaata ataqaaaqaq aaaaaqcatt ttcaggtata 360
qqtqttttqq qaaacaattt ccccqaacca ttatatttct ctacatcaga aaggtataaa 420
tcataaaact ctttgaagtc attctttaca ggagtccaaa taccagagaa tgttttagat 480
acaccatcaa aaattqtata aaqtqqctct aacttatccc aataacctaa ctctccgtcg 540
ctattqtaac caqttctaaa aqctqtattt qaqtttatca cccttqtcac taaqaaaata 600
aatgcagggt aaaatttata tccttcttgt tttatgtttc ggtataaaac actaatatca 660
atttctgtgg ttatactaaa agtcgtttgt tggttcaaat aatgattaaa tatctctttt 720
ctcttccaat tgtctaaatc aattttatta aagttcattt gatatgcctc ctaaattttt 780
atctaaagtg aatttaggag gcttacttgt ctgctttctt cattagaatc aatccttttt 840
taaaaqtcaa tattactqta acataaatat atattttaaa aatatcccac tttatccaat 900
tttcqtttgt tqaactaatg ggtgctttag ttgaagaata aagaccacat taaaaaatgt 960
qqtcttttqt qttttttaa aggatttgag cgtagcgaaa aatccttttc tttcttatct 1020
tgataataag ggtaactatt gaattcggta ccaagagttt gtagaaacgc aaaaaggcca 1080
tecqteaqqa tqqcettetq ettaatttqa tqcetqqeaq tttatqqeqq geqteetqce 1140
cgccaccctc cgggccgttg cttcgcaacg ttcaaatccg ctcccggcgg atttgtccta 1200
ctcaggagag cgttcaccga caaacaacag ataaaacgaa aggcccagtc tttcgactqa 1260
qcctttcqtt ttatttqatq cctqqcaqtt ccctactctc qcatqqqqaq accccacact 1320
accateggeg ctaeggegtt teaettetga gtteggeatg gggteaggtg ggaceaeege 1380
gctactgccg ccaggcaaat tctgttttat cagaccgctt ctgcgttctg atttaatctg 1440
tatcaggctg aaaatcttct ctcatccgcc aaaacaggat ccaattatgg cagatcaatg 1500
agetteacag acacaatate agggacattt gttagttett teacaatttt atetteeaga 1560
tgtctgtcaa aggaaagcat catgatggct tctccgcctt tttccttacg gccaacctgc 1620
atagttgcaa tgttaatatc attatctccg agaatacgtc ctactcggcc gatgacacct 1680
gttgtatctt gatgctggat atacaccaag tgaccagtcg gataaaaatc aatattaaat 1740
ccattgatct cgacaattcg ttctccgaaa tgaggaatat acgtagccgt tacagtaaaq 1800
qtqctqcqqt ctcctqtcac ttttacqctq atqcaqttat cqtatccaga ttcagaagag 1860
qaaatttttt cactqaaqct aatqccqcqt tcttttgcqa cacccccqqc attgacctca 1920
ttaacaqtaq aqtctacqcq cqqttttaaa aaqcctqaca qaaqqqcttt tqtaatgaac 1980
gatgtttcaa gtttagcaat tgtgccttca tattgaatgg caacatcctg tactggttct 2040
ttcatgcact gtgatacaag gctgccaatt tttcctgcaa tttgatggta aggcttaatt 2100
ttagcaaatt catcttttgt catggcaggc aggttgatag ctgacatgac aggcaggcct 2160
tttgcgaact gcagaacttc ttctgacact tgggcggcga cattgagctg tgcttctttc 2220
gttgatgctc ccaagtgagg agtggcaatg actaatggat gatcaacaag tttgttgtca 2280
actggcggtt cgacttcgaa aacgtcaagc gctgctcccg caacatgccc gttttccaaa 2340
gcttcgagaa gtgctgcttc atcgataatt ccgcctcgcg cacagttaat taagcgaacg 2400
ccttttttcg tttttgcaat cgtttcttta ttcaataagc cttttgtttc ttttgttaaa 2460
ggcgtgtgaa cggtaatgat atccgcactt tcaagcactt cttcaaatgt acggctgttt 2520
acqccqattt ttttcqctct ttcttccqtt aagaaaggat caaaaacgtg cacagtcata 2580
ccqaacgctc ctcqacqctq tqcaatttca cttccqattc qgcctaatcc tacaatacca 2640
agegtttttc cataaagctc tgaaccgaca taagctgtgc ggttccactc tctggatttc 2700
actgagatat tagcctgcgg aatgtgtctc attaaagaag agatcattgc aaatgtatgc 2760
tcagctgtcg aaatggtgtt gccgttcgga gcattgatca cgattacccc gtgtttcgta 2820
```

```
qcctcatcaa tatcqatatt atcqacaccq acaccqgctc ttccqacaat ttttaaagaa 2880
gtcattttgt tgaaaaggtc ttctgttact tttgtcgcgc ttcgcaccaa aagagcatca 2940
aaaqtatqta attcatcttc tgcatctgct acgttttttt gaacgatttc aataaagtct 3000
qattcaataa qtggctgtaa accgtcgttg ctcattttgt ctgagaccaa tactcgaaac 3060
atgttttctc ctcctctaga gcgtcctgct gttgttaaga ttattatacc acaccttgta 3120
gataaagtca acaacttttt gcaaaatttt tcaggaattt tagcagaggt tgttctggat 3180
gtagaacaaa acatctttcc gctcttgtgc tgttaggata tctttcttgg aagctaggta 3240
ggcctcgagt tatggcagtt ggttaaaagg aaacaaaaag accgttttca cacaaaacgg 3300
tetttttega tttettttta eagteacage eacttttgea aaaaceggae agetteatge 3360
cttataactg ctgtttcggt cgacgaaaca tcgttagatt tcctcctaaa ttgacaaact 3420
aaatatctqa taatttaaca tattctcaaa agagtgtcaa cgtgtattga cgcagtaaag 3480
qataaaaqta aaqcctaata aatcaatgat ctgacagctt gcaggtaata tatttaattt 3540
qaaqcaattc tctatacaqc caaccaqtta tcqtttataa tqtaattaaa tttcatatga 3600
tcaatcttcq qqqcaqqqtq aaattcccta ccqqcqqtqa tgaqccaatg gctctaagcc 3660
cgcgagctgt ctttacagca ggattcggtg agattccgga gccgacagta cagtctggat 3720
gggagaagat ggaggttcat aagcgttttg aaattgaatt tttcaaacgt ttctttgcct 3780
agcctaattt tcgaaacccc gcttttatat atgaagcggt ttttttattg gctggaaaag 3840
aacctttccg ttttcgagta agatgtgatc gaaaaggaga gaatgaagtg aaagtaaaaa 3900
aattagttgt ggtcagcatg caagcttcgc gaagcggccg ccgacgcgag gctggatggc 3960
cttccccatt atgattcttc tcgcttccgg cggcatcggg atgcccgcgt tgcaggccat 4020
qctqtccaqq caqqtagatq acqaccatca qqqacaqctt caagqatcqc tcqcgqctct 4080
taccaqccta acttcqatca ctggaccqct gatcgtcacg gcgatttatg ccgcctcggc 4140
qaqcacatqq aacqqqttqq catqqattqt aqqcqccqcc ctataccttq tctqcctccc 4200
cgcgttgcgt cgcggtgcat ggagccgggc cacctcgacc tgaatggaag ccggcggcac 4260
ctcgctaacg gattcaccac tccaagaatt ggagccaatc aattcttgcg gagaactgtg 4320
aatgcgcaaa ccaaccettg gcagaacata tecategegt ccgccatete cagcageege 4380
acqcqqcqca tctcqqqcag cgttqqqtcc tqgccacggg tgcgcatgat cgtgctcctg 4440
tcqttqaqqa cccqqctaqq ctqqcqqqqt tqccttactq qttaqcaqaa tgaatcaccq 4500
atacgcqaqc qaacqtqaag cgactqctqc tqcaaaacqt ctgcgacctg agcaacaaca 4560
tgaatqqtct tcqqtttccq tqtttcqtaa aqtctqqaaa cqcqqaaqtc aqcqccctqc 4620
accattatgt tccqqatctg catcqcaqqa tqctqctqqc taccctqtqq aacacctaca 4680
tetqtattaa eqaaqeqetq qeattqaeee tqaqtqattt ttetetqqte eeqeeqeate 4740
cataccqcca qttqtttacc ctcacaacgt tccaqtaacc gggcatgttc atcatcagta 4800
accognated transcription account transcripti
tecceettae aeggaggeat caagtgacea aaeaggaaaa aaeegeeett aaeatggeee 4920
qctttatcaq aaqccaqaca ttaacqcttc tqqaqaaact caacqaqctg qacqcqgatg 4980
aacaggcaga catctgtgaa tcgcttcacg accacgctga tgagctttac cgcagctgcc 5040
tegegegttt eggtgatgae ggtgaaaace tetgaeacat geageteeeg gagaeggtea 5100
cagcttgtct gtaagcggat gccgggagca gacaagcccg tcagggcgcg tcagcgggtg 5160
ttggcgggtg tcggggcgca gccatgaccc agtcacgtag cgatagcgga gtgtatactg 5220
gcttaactat geggeateag ageagattgt aetgagagtg caccatatge ggtgtgaaat 5280
accgcacaga tgcgtaagga gaaaataccg catcaggcgc tcttccgctt cctcgctcac 5340
tgactcgctg cgctcggtcg ttcggctgcg gcgagcggta tcagctcact caaaggcggt 5400
aatacggtta tccacagaat caggggataa cgcaggaaag aacatgtgag caaaaggcca 5460
gcaaaaggcc aggaaccgta aaaaggccgc gttgctggcg tttttccata ggctccgccc 5520
ccctgacgag catcacaaaa atcgacgctc aagtcagagg tggcgaaacc cgacaggact 5580
ataaaqatac caqqcqtttc cccctqqaaq ctccctcqtq cqctctcctg ttccqaccct 5640
geogettace ggatacetgt eegeetttet eeetteggga agegtggege ttteteatag 5700
ctcacqctqt aqqtatctca qttcqqtqta qqtcqttcqc tccaaqctqq qctqtqtqca 5760
cgaacccccc gttcagcccg accgctgcgc cttatccggt aactatcgtc ttgagtccaa 5820
cccggtaaga cacgacttat cgccactggc agcagccact ggtaacagga ttagcagagc 5880
gaggtatgta ggcggtgcta cagagttctt gaagtggtgg cctaactacg gctacactag 5940
aaggacagta tttggtatct gcgctctgct gaagccagtt accttcggaa aaagagttgg 6000
tagctcttga tccggcaaac aaaccaccgc tggtagcggt ggtttttttg tttgcaagca 6060
gcagattacg cgcagaaaaa aaggatctca agaagatcct ttgatctttt ctacggggtc 6120
tgacgctcag tggaacgaaa actcacgtta agggattttg gtcatgagat tatcaaaaag 6180
gatcttcacc tagatccttt taaattaaaa atgaagtttt aaatcaatct aaagtatata 6240
tgagtaaact tggtctgaca gttaccaatg cttaatcagt gaggcaccta tctcagcgat 6300
ctgtctattt cgttcatcca tagttgcctg actccccgtc gtgtagataa ctacgatacg 6360
ggagggetta ccatetggec ecagtgetge aatgataceg egagacecae geteaeegge 6420
```

tccagattta	tcagcaataa	accagccagc	cggaagggcc	gagcgcagaa	gtggtcctgc	6480
aactttatcc	gcctccatcc	agtctattaa	ttgttgccgg	gaagctagag	taagtagttc	6540
gccagttaat	agtttgcgca	acgttgttgc	cattgctgca	ggcatcgtgg	tgtcacgctc	6600
gtcgtttggt	atggcttcat	tcagctccgg	ttcccaacga	tcaaggcgag	ttacatgatc	6660
ccccatgttg	tgcaaaaaag	cggttagctc	cttcggtcct	ccgatcgttg	tcagaagtaa	6720
gttggccgca	gtgttatcac	tcatggttat	ggcagcactg	cataattctc	ttactgtcat	6780
gccatccgta	agatgctttt	ctgtgactgg	tgagtactca	accaagtcat	tctgagaata	6840
gtgtatgcgg	cgaccgagtt	gctcttgccc	ggcgtcaata	cgggataata	ccgcgccaca	6900
tagcagaact	ttaaaagtgc	tcatcattgg	aaaacgttct	tcggggcgaa	aactctcaag	6960
gatcttaccg	ctgttgagat	ccagttcgat	gtaacccact	cgtgcaccca	actgatcttc	7020
agcatctttt	actttcacca	gcgtttctgg	gtgagcaaaa	acaggaaggc	aaaatgccgc	7080
aaaaaggga	ataagggcga	cacggaaatg	ttgaatactc	atactcttcc	tttttcaata	7140
ttattgaagc	atttatcagg	gttattgtct	catgagcgga	tacatatttg	aatgtattta	7200
gaaaaataaa	caaatagggg	ttccgcgcac	atttccccga	aaagtgccac	ctgacgtcta	7260
agaaaccatt	attatcatga	cattaaccta	taaaaatagg	cgtatcacga	ggccctttcg	7320
tcttcaagaa						7330